

· 11/15/17

"The will to succeed is important, but what's more important is the will to prepare."-Bobby Knight

HW: "2017 A2 CC L20 Simplifying Rational Expressions" #8-12, 16

AIM: How do we Simplify Rational Expressions?

Warm Up:

1) What does "Undefined" mean?

When a fraction has 0 as its denominator

2) What does it mean to "simplify"?

Perform all possible operations

Fractions!

When we see rational expressions we should immediately factor what we can!

Once the denominator is factored we can identify any restrictions. We write the restrictions to avoid undefined fractions.

(what makes undefined)

When everything is factored we can "cancel" any common factors of the numerator and the denominator.

You can only cancel factors, not terms!

$$\frac{\cancel{x} + 3}{\cancel{x}} \leftarrow \text{No!}$$

$$\frac{5(\cancel{x+3})}{(x+2)(\cancel{x+3})} \leftarrow \text{Yes!}$$

⊗ FACTOR FIRST

2. Find the value(s) of the variable for which each rational expression is not defined.

(a) $\frac{x^2 - 49}{2x^2 - 3x} \neq 0$

$$\begin{array}{l|l} x(2x-3) \neq 0 & \\ \hline x \neq 0 & 2x-3 \neq 0 \\ & \begin{array}{r} +3 \quad +3 \\ \hline 2x \neq 3 \\ \frac{2}{2} \quad \frac{3}{2} \\ \hline x \neq \frac{3}{2} \end{array} \end{array}$$

(b) $\frac{4}{c^2 - 16}$

$$\begin{array}{l} c^2 - 16 \neq 0 \\ (c-4)(c+4) \\ \hline c \neq 4 \quad | \quad c \neq -4 \end{array}$$

Undefined

All
 $c^2 - 16 \neq 0$

$c^2 \neq 16$

$c \neq \pm 4$

(d) $\frac{6}{3x^3 - 8x^2 + 4x}$

$3x^3 - 8x^2 + 4x \neq 0$

$x(3x^2 - 8x + 4) \neq 0$

$$\begin{array}{r|l} 3x^2 - 6x & -2x + 4 \\ \hline 3x(x-2) & -2(x-2) \end{array}$$

$$\begin{array}{l|l|l} x(x-2)(3x-2) \neq 0 & & \\ \hline x \neq 0 & x \neq 2 & 3x-2 \neq 0 \\ & & 3x \neq 2 \\ & & x \neq \frac{2}{3} \end{array}$$

$a = 12$
 $b = -8$

$x^2 + 4 \neq 0$
 $\pm \sqrt{x^2} \neq \pm \sqrt{-4}$

$x = \pm \sqrt{-4}$

$x = \pm 2i$

No Real

#s make it undefined

HW Check

$$1) \frac{5}{x} \quad x \neq 0$$

$$2) \frac{11}{x-7} \quad \begin{array}{l} x-7 \neq 0 \\ +7 \quad +7 \\ \hline x \neq 7 \end{array}$$

$$3) \frac{x-2}{x^2-9} \quad \begin{array}{l} x^2-9 \neq 0 \\ (x-3)(x+3) \neq 0 \\ \hline x \neq 3 \quad | \quad x \neq -3 \end{array}$$

$$4) \frac{x^2-x-12}{x^2-7x+10} \quad \begin{array}{l} x^2-7x+10 \neq 0 \\ (x-2)(x-5) \neq 0 \\ \hline x \neq 2 \quad | \quad x \neq 5 \end{array}$$

$$5) \frac{3}{b^2-2b+1} \quad \begin{array}{l} b^2-2b+1 \neq 0 \\ (b-1)(b-1) \neq 0 \\ \hline b \neq 1 \quad | \quad b \neq 1 \end{array}$$

$$3. \frac{15x^2}{35x^4} = \frac{\cancel{5} \cdot 3 \cancel{x} \cancel{x}}{\cancel{5} \cdot 7 \cancel{x} \cancel{x} \cancel{x} \cancel{x}} = \boxed{\frac{3}{7x^2}}$$

$$4. \frac{x^2 + 2x}{x} = \frac{\cancel{x}(x+2)}{\cancel{x}} = \frac{x+2}{1} = \boxed{x+2}$$

$$5. \frac{2x^2 - 8}{(2x-1)(x-2)} = \frac{2(x^2-4)}{(2x-1)(x-2)} = \frac{2\cancel{(x-2)}(x+2)}{(2x-1)\cancel{(x-2)}} = \boxed{\frac{2(x+2)}{2x-1}}$$

OR

$$6. \frac{4b^2 - 4ab}{3a^2 - 3ab} = \frac{4b(b-a)}{3a(a-b)} = \frac{4b(-1)}{3a} = \boxed{-\frac{4b}{3a}}$$

$\frac{2x+4}{2x-1}$

$$7. \frac{x^2 + 6x + 5}{x^2 - x - 2} = \frac{(x+5)(x+1)}{(x+1)(x-2)} = \boxed{\frac{x+5}{x-2}}$$

Can't cancel!

$$\frac{\cancel{7}+5}{\cancel{7}} = \frac{12}{7}$$
$$5 \neq \frac{12}{7}$$

$$\frac{10-2}{2-10} = \frac{8}{-8} = -1$$

$$\frac{10-21}{21-10} = \frac{-11}{11} = -1$$

$$\frac{7-2}{2-7} = \frac{5}{-5} = -1$$

$$\frac{a+b}{b+a} = 1$$

$$\frac{a-b}{b-a} = -1$$

$$13. \frac{x^2 - 4}{x^4 - 16}$$

$$17. \frac{a^2 - b^2}{a^2 - 6b - ab + 6a}$$